NORTH CAROLINA DIVISION OF AIR QUALITY

Application Review

Issue Date: XXXX XX, 2018

Region: Raleigh Regional Office
County: Orange
NC Facility ID: 6800043
Inspector's Name: Stanley Williams
Date of Last Inspection: 08/30/2017
Compliance Code: 3 / Compliance - inspection

Facility Data

Applicant (Facility's Name): The University of North Carolina at Chapel Hill

Facility Address:
The University of North Carolina at Chapel Hill
200 East Cameron Avenue, CB#1000
Chapel Hill, NC 27599

SIC: 8221 / Colleges And Universities, Nec
NAICS: 61131 / Colleges, Universities, and Professional Schools

Facility Classification: Before: Title V **After:** Title V
Fee Classification: Before: Title V **After:** Title V

Permit Applicability (this application only)

SIP: 15A NCAC 02D .0501, .0503, .0504, .0515, .0516, .0521, and .0614
NSPS: 15A NCAC 02D .0524 – Subpart Db, Subpart Y & Subpart IIII
NESHAP: 15A NCAC 02D .1109 112(j) and .1111 Subpart ZZZZ & Subpart DDDDD
PSD: N/A
PSD Avoidance: N/A
NC Toxics: N/A
112(r): N/A
Other: N/A

Contact Data

Facility Contact	Authorized Contact	Technical Contact
J. Daw Environmental Compliance Officer (919) 962-6666 UNC at Chapel Hill Chapel Hill, NC 27599+1650	Jonathan Pruitt Vice Chancellor, Finance and Operations (919) 962-3795 UNC at Chapel Hill Chapel Hill, NC 27599+1000	J. Daw Environmental Compliance Officer (919) 962-6666 UNC at Chapel Hill Chapel Hill, NC 27599+1650

Application Data

Application Number: 6800043.15A, 15B & 18A
Date Received: 05/15/15, 07/24/15 & 03/19/18
Application Type: Renewal/Modifications
Application Schedule: Renewal/TV-Significant/TV-Minor

Existing Permit Data
Existing Permit Number: 03069/T35
Existing Permit Issue Date: 03/22/2018
Existing Permit Expiration Date: 03/31/2021

Total Actual emissions in TONS/YEAR:

CY	SO2	NOX	VOC	CO	PM10	Total HAP	Largest HAP
2016	239.85	286.72	2.82	60.20	11.82	12.13	10.75 [Hydrogen chloride (hydrochlori]
2015	236.71	375.22	2.20	59.50	14.06	16.37	15.05 [Hydrogen chloride (hydrochlori]
2014	176.66	294.44	1.76	51.65	12.88	15.08	13.92 [Hydrogen chloride (hydrochlori]
2013	188.80	372.97	2.27	55.13	11.96	7.85	6.60 [Hydrogen chloride (hydrochlori]
2012	159.35	398.25	2.93	64.10	11.91	7.67	6.23 [Hydrogen chloride (hydrochlori]

Review Engineer: David B. Hughes **Review Engineer's Signature:** **Date: XXXX XX, 2018**	**Comments / Recommendations:** **Issue** 03069/T36 **Permit Issue Date: XXXX XX, 2018** **Permit Expiration Date: XXXX XX, 2023**

I. Purpose of Applications

Application No. 6800043.15B

This permitting action is a renewal of an existing Title V permit pursuant to 02Q .0513. The existing Title V permit (**03069T35**) was issued on **March 22, 2018**, with an expiration date of **March 31, 2021**. The renewal application **6800043.15B** was received on **July 24, 2015**, or at least nine months prior to the original expiration date **April 30, 2016**. Therefore, the existing permit shall not expire until the renewal permit has been issued or denied. All terms and conditions of the existing permit shall remain in effect until the renewal permit has been issued or denied.

Application No. 6800043.15A

Air Permit Application No. **6800043.15A** was received on **May 18, 2015** for a significant modification to Boilers ID Nos. ES-001-Boiler #6 and ES-002-Boiler #7 15A NCAC 02D .1109 112(j) Boiler MACT operating limits. The University of North Carolina at Chapel Hill (UNC-CH) is required to conduct 112(j) compliance performance tests on Boiler Nos. 6 and 7 at the Cogeneration Facility. These two (2) boilers are equipped with limestone injection/baghouse air pollution control systems for the control of acid gases and particulate matter (PM), including hydrogen chloride (HCl), mercury (Hg), and other hazardous metals regulated by the 112(j) Boiler MACT. During the 112(j) performance tests, UNC-CH is required to monitor the concurrent limestone injection rates and oxygen (O_2) trim concentrations to establish 112(j) operating limits to be monitored for continuous compliance demonstrations with the 112(j) emissions limits for HCl-equivalents, Hg, and carbon monoxide (CO). The University's Title V air permit (#03069T32) stipulates that the University submit a permit modification application to incorporate the limestone injection rate and O_2 trim concentration operating limits into the Title V permit within 60-days following the N.C. Division of Air Quality's (DAQ) approval of the 112(j) performance test report.

Three (3) separate 112(j) performance tests were performed. The initial 112(j) performance tests on Boiler Nos. 6 and 7 were conducted on July 9-10, 2013. Compliance with all the 112(j) emission limits was demonstrated during the July 2013 tests. However, because the boilers were operated at only approximately 55% steam load during the July 2013 tests, DAQ deferred official written approval of these tests to avoid requiring the University to submit a permit application to incorporate limestone injection rate and O_2 trim concentration operating limits into the permit that would be based on <90% operating load conditions. Because of the low operating load conditions that were achievable during the initial July 2013 performance tests, the University conducted a second round of 112(j) performance tests on March 4-5, 2014 with both boilers operated at >90% operating steam load. The intent of this testing was to obtain data to set the required limestone injection rate and O_2 trim concentration operating limits based on testing of the boilers at >90% operating steam load conditions. Compliance with the 112(j) emission limits for PM, Hg, and HCl was again demonstrated during the March 2014 tests. However, during the March 2014 testing, the test contractor inadvertently failed to record the CO concentrations measured during the tests. As a result, the University scheduled a third round of 112(j) performance tests conducted on December 17-18, 2014 after campus steam demand increased to allow testing for all 112(j) regulated pollutants at >90%

steam load operating conditions. Compliance with the 112(j) emission limits for PM, Hg, HCl and CO was again demonstrated during the December 2014 tests.

The proposed emission limits are based on the July 2013, March 2014, and December 2014 112(j) performance tests. The University proposes to base the Hg and HCl-equivalent control sorbent injection rate operating limit on the highest coal to sorbent feed rate ratio at which compliance was demonstrated during the three (3) performance tests. Since Boiler Nos. 6 and 7 are identical units, the University proposes a maximum **9.53 lb/lb coal/wood to limestone feed rate** ratio as the limestone injection Hg and HCl-equivalent operating limit for both boilers based on the value (9.53 lb/lb for Hg and 9.53 lb/lb for HCl-equivalent) from the April 5, 2014 Hg and HCl performance test on Boiler 7.

As promulgated by EPA in the reissued federal Boiler MACT [§63.7525(a)(2)], the surrogate O_2 operating limit must be set at the minimum percent oxygen by volume that is established during CO emission limit performance test(s). The O_2 operating limit must be based on the lowest hourly average oxygen concentration measured (lowest of three 1-hr test runs during CO test). Based on the December 17-18, 2014 test results, the University proposes a minimum **3.74% O_2 trim concentration** 30-day average operating limit for CO continuous compliance monitoring for both identical Boiler Nos. 6 and 7.

Application No. 6800043.18A

Air Permit Application No. 6800043.18A was received on **March 19, 2018** for a minor modification pursuant to 15A NCAC 02Q .0515 to add a dry sorbent injection system (DSI) (ID Nos. CD-004.3 and CD-005.3) on each of ES-001-Boiler #6 and ES-002-Boiler #7 to supplement the existing hydrogen chloride (HCl) control provided by the limestone injection/baghouse systems to ensure compliance with the 15A NCAC 02D .1111 Maximum Achievable Control Technology (MACT) 40 CFR 63, Subpart DDDDD HCl emission limit. See Section VIII. for a description of the addition of the two DSI systems.

UNC-CH has also requested that the current 15A NCAC 02D 112(j) Case-by-Case MACT permit conditions applicable to all six (6) on campus boilers (ID Nos. ES-001-Boiler #6, ES-002-Boiler #7, ES-003-#8, ES-004-Boiler #9, ES-005-Boiler #10 and ES-SB-6) be replaced with a generic interim permit condition requiring compliance of the boilers with 15A NCAC 02D .1111 MACT 40 CFR 63, Subpart DDDDD. DAQ has decided that the 112(j) permit conditions for each boiler will remain in the permit since all six boilers will still be subject to 112(j) conditions until May 19, 2019. However, 40 CFR 63, Subpart DDDDD Boiler MACT language will be added to the permit since all six boilers will be subject to those permit conditions as of May 20, 2019. The Boiler MACT language was drafted by Joe Voelker of Raleigh Central Office (RCO) for each boiler. The language used for each boiler depended on several factors; (1) size of the boiler, (2) fuel type, (3) do the boilers have O_2 auto trim system? (4) subcategories 63.7499 for boilers #6 and #7, (5) do the No.2 fuel oil boilers (#6, #7, #8, #9 and #10) use ultra-low sulfur? and (6) do the No. 2 fuel oil boilers burn No.2 fuel oil during gas curtailment?

II. Facility Description

UNC-CH operates a 760-acre campus located in Chapel Hill, North Carolina. The University's principal sources of regulated air pollutant emissions include a Co-generation facility on Cameron Avenue near the main campus, a Steam Plant on Manning Drive near the UNC Hospitals complex and a Landfill gas (LFG)-fired generator and LFG flare at the landfill. The facility is a nonprofit educational public university that consists of numerous combustion sources including boilers, hot water heaters, emergency generators, fire pumps, etc. It also consists of some non-combustion

sources such as coal handling, crushing and storage equipment, and ash handling, storage and loading equipment, and a few storage tanks.

III. History/Background/Application Chronology

May 18, 2015 – Permit application **6800043.15A** received as a Title V significant modification application. The application was deemed complete for processing.

July 24, 2015 – Permit application **6800043.15B** received as a Title V renewal application. The application was deemed complete for processing.

June 16, 2016 – Permit **03069T34** issued as a Title V minor modification. This was the first modification post original expiration date (April 30, 2016). Permit **03069T34** was given a new 5-year life set to expire on the earlier of March 31, 2021 or the renewal of Permit **03069T33**.

August 30, 2017 – Stanley Williams of the Raleigh Regional Office (RRO) completed the annual compliance inspection of the facility.

March 19, 2018 – Permit application **6800043.18A** received as a Title V minor modification application. The application was deemed complete for processing.

March 22, 2018 – Permit **03069T35** issued as a Title V Part 1 significant modification.

June 12, 2018 – David B. Hughes e-mailed Larry Daw of UNC-CH with a question about the two Dry Sorbent Systems that each consist of a sorbent storage silo with a bin vent filter and weigh/feed hoppers with bin vent filters, blowers, piping and injection nozzles for Boilers #6 and #7 and four questions about the six boilers. The sorbent storage silos and weigh/feed hoppers are insignificant sources excluded from permitting under 15A NCAC 02Q .0503(B). The first question was what ID Nos. did they want to assign to the sorbent storage silos and weigh/feed hoppers? The four questions about the six boilers were to determine what type of 15A NCAC 02D .1111 MACT 5D language to use for each boiler. *Timothy Aucoin of UNC-CH called David B. Hughes on **June 13, 2018** with the ID Nos. for the insignificant sources. ID Nos. IES-SB-18 and IES-SB-19 for the sorbent storage silos, Boiler #6 and #7 respectively and ID Nos. IES-SB-20 and IES-SB-21 for the weigh/feed hoppers, Boiler #6 and #7 respectively. He also answered all four questions pertaining to the six boilers*.

June 16, 2018 – David B. Hughes e-mailed Stanley Williams of RRO asking him if the facility had been documenting and maintaining the NOx emissions for the last 5 years per 15A NCAC 02D .0530(u). *Stanley Williams replied via e-mail on **June 19, 2018** that the facility had been documenting and maintaining the NOx emissions for the last 5 years. Therefore, 15A NCAC 02D .0530(u) may be removed from the Permit.*

XXXX XX, 2018 - DRAFT permit sent to Permittee, Supervisor and RRO for comment. Stanley Williams of RRO states via e-mail on **September 17, 2018** that he has reviewed the draft permit and his comments were discussed with UNC-CH and incorporated with their comments. Samir Parekh of RCO states via e-mail on **August 30, 2018** that he has reviewed the draft permits and had comments on the Compliance Assurance Monitoring (CAM) section. The Permittee provided comments on draft permit via e-mail on **September 6, 2018**.

DAQ made all of the changes that were requested by the Permittee except for changing the 3-hour block to a 30-day rolling average in Section 2.1 4.k.vii and 2.1 4.k.vii (15A NCAC 02D .1109: CAA § 112(j); Case-by-Case MACT for Boilers & Process Heaters). The Permittee requested to change compliance based on a 30-day rolling average of monitoring data consistent with §112(d) of the Clean Air Act (CAA). Since Boilers (Nos. ES-001-Boiler #6 and ES-002-Boiler #7) are subject to 112(j) until May 19, 2019 and three 1-hour runs were done to show compliance with 112(j), DAQ has decided to keep the 3-hour block language in the permit. The 112(d) MACT regulations will be in effect May 20, 2019 with compliance being based on the 30-day rolling average.

IV. Permit Modifications/Changes and ESM Discussion

Page	Section	Description of Change
Attachment	Insignificant activities	-revised dates, names, permit revision number -added sorbent storage silos IES-SB-18 and IES-SB-19 to Boilers #6 and #7 respectively -added weigh/feed hoppers IES-SB-20 and IES-SB-21 to Boilers #6 and #7 respectively
Cover	---	-amended all dates and permit revision numbers
All	Header	-amended permit revision number
8	Section 1 Table	-Permittee requested that Dry Sorbent Injection System (DSI) ID No. CD-004.3 be added as a control device to Boiler #6 and that DSI ID No. CD-005.3 be added as a control device to Boiler #7. -removed Emergency generator (ID No. ES-Gen-38) located at the North Side Chiller
9	2.1 A	-added Dry Sorbent Injection Systems (ID Nos. CD-004.3 and CD-005.3).
31	2.1 A Table	-added emission limits for 15A NCAC 02D .1111 MACT 5D.
32	2.1 A.4	-added shell language for 15A NCAC .02D .1109 112(j); Case by Case MACT.
33	2.1 A.4.c	-corrected cross reference
34	2.1 A.4.e	-added sorbent injection rate of 9.53 lb coal (and/or wood) to ensure compliance with mercury and HCl-equivalent limitations.
34	2.1 A.4.i	-added O_2 trim concentration of 3.74% O_2 to ensure compliance with CO limitations.
38	2.1 A.4.j.vi	-corrected cross reference
44	2.1 A.4.k	-corrected cross reference
48	2.1 A.4.l	-corrected cross reference
48 & 49	2.1 A.4.r	-corrected cross reference
53	2.1 A.5	-removed 15A NCAC 02D .0530(u)
	2.1 A.5	-added 15A NCAC 02D .1111 MACT 5D
	2.1 B Table	-added emission limits for 15A NCAC 02D .1111 MACT 5D
	2.1 B.5	-added 15A NCAC 02D .1111 MACT 5D
	2.1 C Table	-added emission limits for 15A NCAC 02D .1111 MACT 5D
	2.1 C.5	-added 15A NCAC 02D .1111 MACT 5D
	2.1 G.3-2 Table	-removed Emergency generator (ID No. ES-Gen-38) located at the North Side Chiller

Page	Section	Description of Change
	2.1 G.3.f	-updated language for Operating Restrictions for 15A NCAC 02D .1111 MACT 4Z
	2.1 I.2	-added 15A NCAC 02D .1111 MACT 5D
---	2.2 F	-removed 15A NCAC 02D .2400 "Clean Air Interstate Rule" (CAIR)
	3	-updated shell conditions (v5.3, 08/21/2018)

There were only minor, non-significant modifications to the equipment descriptions needed in Title V Equipment Editor (TVEE).

V. Regulatory Review

The facility is currently subject to the following regulations:

15A NCAC 02D .0501, Compliance with Emission Control Standards
15A NCAC 02D .0503, Particulate Emissions from Fuel Burning Indirect Heat Exchangers
15A NCAC 02D .0515, Particulates from Miscellaneous Industrial Process
15A NCAC 02D .0516, Sulfur Dioxide Emissions from Combustion Sources
15A NCAC 02D .0521, Control of Visible Emissions
15A NCAC 02D .0524, New Source Performance Standards (40 CFR 60 Subpart Db), (40 CFR 60, Subpart Y), and (40 CFR 60, Subpart IIII)
15A NCAC 02D .1109, 112(j); Case-by-Case MACT for Boilers and Process Heaters
15A NCAC 02D .1111, Maximum Achievable Control Technology (40 CFR 63, Subpart ZZZZ) and (40 CFR 63, Subpart DDDDD)
15A NCAC 02D .0614, Compliance Assurance Monitoring

A regulatory review for these current permit conditions will not be included in this document. These conditions have been modified as necessary to bring them up to date with the current shell conditions.

VI. NSPS, NESHAPS/MACT, PSD, 112(r), CAM, CAIR

NSPS – The Permittee is subject to 15A NCAC 02D .0524: New Source Performance Standards and 40 CFR Part 60, Subpart Db "Standards of Performance for Industrial-Commercial-Institutional Steam Generating Units" for Boilers (ID Nos. ES-001-Boiler #6, ES-002-Boiler #7, ES-003-Boiler #8, ES-004-Boiler #9 and ES-005-Boiler #10), 15A NCAC 0524: NSPS and 40 CFR Part 60, Subpart Y "Standards of Performance for Coal Preparation and Processing Plants" for One coal handling, conveying, crushing and storage system, and 40 CFR Part 60, Subpart IIII, "Standards of Performance for Stationary Compression Ignition Internal Combustion Engines. 40 CFR Part 60, Subpart IIII regulation applies to owners or operators of compression ignition (CI) reciprocating internal combustion engines (RICE) manufactured as a certified National Fire Protection Association (NFPA) fire pump engine after July 1. 2006. Diesel-fired generators (ID Nos. ES-EG#13, ES-EG#17, ES-EG#18, ES-EG#19, ES-EG#20, ES-EG#21, ES-Gen-2, ES-Gen-12, ES-Gen-13, ES-Gen-43, ES-Gen-48, ES-Gen-49, ES-Gen-71, ES-Gen-72, ES-Gen-79, ES-Gen-80, ES-Gen-81, ES-84) and diesel-fired water pumps (ID Nos. ES-FP-1 and ES-FP-3) are all subject to 40 CFR 60, Subpart IIII. The permit renewal/modification does not affect this status.

NESHAPS/MACT – The six Boilers (ID Nos. ES-001-Boiler #6, ES-002-Boiler #7, ES-003-Boiler #8, ES-004-Boiler #9, ES-Boiler #10 and ES-SB-6) are all subject to 15A NCAC 02D .1109 112(j); Case-by-Case MACT for Boilers and Process Heaters until **May 19, 2019**. The six Boilers will be

subject to 15A NCAC 02D .1111: Maximum Achievable Technology (MACT) and 40 CFR Part 63 Subpart DDDDD "National Emissions Standards for Hazardous Air Pollutants for Major Sources: Industrial, Commercial, and Institutional Boilers and Process Heaters" on **May 20, 2019**. The Permittee is also subject to 15A NCAC 02D .1111: MACT and 40 CFR Part 63 Subpart ZZZZ, "National Emission Standards for Hazardous Air Pollutants for Stationary Reciprocating Internal Combustion Engines". 40 CFR Part 63 applies to RICE located at a major or area source of hazardous air pollutants (HAP). There are Eighty-two diesel-fired, compression ignition, emergency generators; Two natural gas-fired, spark ignition, emergency generators, Three No. 2 fuel oil-fired fire water pumps and Two No. 2 fuel oil-fired, compression ignition, non-emergency generators that are subject to 40 CFR 63, Subpart ZZZZ. This permit renewal/modification does not affect this status.

PSD – The Permittee is an existing major source for NOx and SO_2 because of the large boilers at the University's Cogeneration Facility. The University is excluded from mandatory federal PSD modeling requirements as a "not for profit educational institution" under 40 CFR section 52.21(i)(1)(vi).

15A NCAC 02Q .0317: Avoidance Condition for 15A NCAC 02D .0530: Prevention of Significant Deterioration was removed in Air Permit No. 03069T31 on May 16, 2013 and replaced with regulation 15A NCAC 02D .0530(u): Prevention of Significant Deterioration. 15A NCAC 02D .0530(u) 2.1 A.5.c requires that the Permittee maintain records of actual emissions of NO_x in tons per year on a calendar year basis for **five years** following the resumption of regular operation after commencement of burning mixture of wood/torrified wood and coal (up to 20% wood/terrified wood and up to 80% coal, both on a heat input basis) in each boiler (ID Nos. ES-001-Boiler #6 and ES-002-Boiler #7). The Permittee shall make the information, documented and maintained in this Section 2.1 A.5.c., available to the Director or the general public pursuant to the requirements in 40 CFR 70.4(b)(3)(viii). The Permittee shall be deemed in noncompliance with 15A NCAC 02D .0530(u) if these records are not maintained. The five year period has expired and Stanley Williams of RRO has confirmed that UNC-CH has been documenting and maintaining the NO_x emissions for the last five years. Therefore, as part of this renewal 15A NCAC 02D .0530(u) will be removed from the permit.

112(r) – The facility is not subject to Section 112(r) of the Clean Air Act requirements because it does not store one or more of the regulated substances in quantities above the thresholds in the Rule. This permit renewal/modification does not affect this status.

CAM

40 CFR 64 requires that a continuous compliance assurance monitoring plan be developed for all equipment located at a major facility that have pre-controlled emissions above the major source threshold and use a control device to meet an applicable standard. The control devices that are subject to CAM are Bagfilter (ID No. CD-004) for Boiler (ID No. ES-001-Boiler #6) and Bagfilter (ID No. CD-005) for Boiler (ID No. ES-002-Boiler #7). The CAM requirements were added to the permit during the renewal (T19). See Booker Pullen's Air Permit Review, Application No. 6800043.04C issued October 3, 2006 for CAM determination. No new control devices have been added since the original analysis was conducted. The permit renewal/modification does not affect the CAM requirements in the permit.

CAIR

The Clean Air Interstate Rules ("CAIR") were originally implemented under 40 CFR Part 52 and included in North Carolina's SIP under 15A NCAC 02D .2400. According to 40 CFR 52.35(f) and 52.36(e), CAIR no longer applies as of January 1, 2015. Furthermore, North Carolina has allowed the

rules under 02D .2400 to expire. Therefore, CAIR no longer applies to this facility. References to CAIR will be removed from the permit.

The Cross-State Air Pollution Rule ("CSAPR", 40 CFR Part 97, Subparts AAAAA, BBBBB, and CCCCC) was planned as a replacement for CAIR. CSAPR was originally scheduled to take effect on January 1, 2012, but was challenged and initially vacated by the DC Circuit Court. Legal issues were finally resolved in April 2014, when the US Supreme Court reversed that decision. Because the regulation was delayed by court proceedings, the effective date of the rule was moved to January 1, 2015.

CSAPR explicitly only applies to sources considered large electric generators and that produce electricity for sale (for example, see 40 CFR 97.404(a)(1)). UNC-CH does not sell electricity produced by the generators, so this facility is not subject to CSAPR.

VII. Facility Wide Air Toxics

Under 15A NCAC 02Q .0702(a)(27)(B), sources subject to a MACT regulation under 40 CFR Part 63 are excluded from the requirements to obtain a permit to emit Toxic Air Pollutants (TAPs). NCAC 02D .1100: Control of Toxic Air Pollutants (TAP) limits and NCAC 02Q .0711: Emission Rates Requiring a Permit (TPER) limits for MACT sources were removed in Air Permit 03069T32. See Jeff Twisdale's Air Permit Review, Application No. 6800043.14A issued September 10, 2014 for removal analysis.

Previously, the Permittee made a facility-wide demonstration that TAP emissions are either below its respective TPER listed in 15A NCAC 02Q .0711 or is in compliance with its modeled emission rate. The facility shall continue to be operated in such a manner that any new, existing or increased actual emission of any TAP do not exceed the TPERs without first evaluating and determining whether an air permit to construct would be required. This permit renewal/modification does not affect this status.

VIII. Dry Sorbent Injection Systems (ID Nos. CD-004.3 and CD-005.3)

The North Carolina Department of Environmental Quality's (DEQ) current 15A NCAC 02D .1109 112(j); Case-by-Case MACT for Boilers and Process Heaters and 40 CFR 63, Subpart DDDDD both present emission limits for HCl for Boiler Nos. 6 and 7 at the Cogeneration Facility when these units are firing coal and/or wood-based fuels. The current 112(j) HCl emission limit for Boiler Nos. 6 and 7 is a risk-based standard of a maximum 435.5 lb/hr of HCl-equivalent emissions from the common stack serving both boilers. The federal Boiler MACT 5D limit for both boilers when firing coal and/or wood-based fuels effective May 20, 2019 is a much more stringent limit of 0.022 lb/million Btu (lb/MMBtu) of heat input. By comparison, at the maximum firing rate of 323.17 MMBtu/hr for each boiler, the federal Boiler MACT 5D 0.022 lb/MMBtu HCl limit is equivalent to a maximum of only 7.11 lb/hr from each boiler, with a total of 14.22 lb/hr of HCl from the common stack, versus the currently allowed 112(j) MACT HCl limit of 435.5 lb/hr. Boiler Nos. 6 and 7 are currently equipped with limestone (CaCO3) injection systems (ID Nos. CD-004.1 and CD-005.1) and baghouses (ID Nos. CD-004.2 and CD-005.2) for the control of sulfur dioxide (SO_2) at $\geq$90% control in compliance with New Source Performance Standards (NSPS) 40 CFR 60, Subpart Db. The existing limestone injection systems and baghouses also provide some limited HCl control. However, a review of the available emission test data for HCl emissions from Boiler Nos. 6 and 7 indicates that the existing limestone injection/baghouse control systems may have difficulty meeting the Boiler MACT 5D 0.022 lb/MMBtu (14.22 lb/hr) limit, when the units are firing moderate to high chlorine content coals. Therefore, the University plans to enter into a design/build contract with an engineering/construction

firm for the installation of the DSI systems on each Boiler Nos. 6 and 7. The design/build contract will allow for ongoing concurrent detailed system design and equipment installation under the minor permit modification, and will facilitate completion of the project by May 20, 2019. The two (2) DSI systems on Boiler Nos. 6 and 7 will each consist of a sorbent storage silo (ID Nos. IES-SB-18 and IES-SB-19) with a ben vent filter, weigh/feed hoppers (ID Nos. IES-SB-20 and IES-SB-21) with bin vent filters, rotary air locks, blowers, piping, and injection nozzles to inject the sorbent into the boiler exhaust ductwork before the existing baghouses. The University plans on using commercially available calcium hydroxide [$Ca(OH)_2$] sorbent, typically referred to as hydrated lime. However, the University may choose to use a proprietary enhanced $Ca(OH)_2$ sorbent to reduce the amount of sorbent actually required to meet the 0.022 lb/MMBtu (14.22 lb/hr) Boiler MACT 5D HCl limit.

The required sorbent injection rate to achieve the HCL emission limit on each boiler is dependent on several factors including the coal/wood firing rate, the coal/wood heating value, the chlorine content of the coal/wood, the sorbent residence time, scavenging of sorbent by other pollutants (SO_2), and sorbent particle size. Because of the inherent inefficiency (<100%) in any control system, excess sorbent above the stoichiometric amount to react with a given amount of HCl is generally required to achieve a desired control efficiency. The required excess sorbent is often quantified as the stoichiometric rate which is the ratio of the sorbent actually required to the theoretical sorbent required to react with the acid gas. The preliminary design capacity of the proposed DSI system on each of Boiler Nos. 6 and 7 is a maximum injection rate of 400 lb/hr of sorbent. The Boiler MACT will require that actual sorbent injection rate during HCl compliance tests be used to establish surrogate sorbent injection operating limits to monitor for demonstrating continuous compliance with HCL 0.022 lb/MMBtu (14.22 lb/hr) limit. The format of the sorbent injection rate operating limits will be in units of the maximum lb coal/lb sorbent. The actual sorbent injection rates required to meet the 30-day rolling average Boiler MACT HCl limits on a continuing basis are expected to be lower than the 400 lb/hr capacity of each system. The initial performance test to establish the sorbent injection rate operating limits must be performed within 180-days after May 20, 2019.

The existing emission control systems on Boiler Nos. 6 and 7 include limestone injection (ID Nos. CD-004.1 and CD-005.1) into the boiler furnaces for acid control, with baghouses (ID Nos. CD-004.2 and CD-005.2) on the boiler exhausts to control PM. Both Boiler Nos. 6 and 7 are currently equipped with a limestone injection continuous parameter monitoring system (CPMS) that measures the concurrent coal/wood: limestone feed rate ratios. With installation of the DSI systems, a duct sorbent injection CPMS will also be installed on each boiler to monitor the coal/wood: duct sorbent injection rate ratios.

While each DSI system constitutes an emission control device, the sorbent storage silos (ID Nos. IES-SB-18 and IES-SB-19), weigh/feed hoppers (ID Nos. IES-SB-20 and IES-SB-21), and associated bin vent filters also constitute a potential source of PM. However, calculations included in the application show that maximum potential uncontrolled PM10 emissions (0.412 ton/yr) from these sources are well below the 5.0 ton/yr permitting exclusion threshold presented in Rule 15A NCAC 02Q .0503(8). Therefore, the sorbent storage silos and weigh/feed hoppers are considered Insignificant sources.

IX. Potential Emissions from Dry Sorbent Injection Systems

The six (6) boilers at the University subject to the Boiler MACT 5D emit numerous regulated criteria and hazardous/toxic air pollutants. With the addition of the DSI systems, there will be no changes in emissions from Boiler Nos. 8, 9, 10 and ES-SB-6. The only boilers with any proposed equipment modifications (DSI installation) potentially affecting current emission rates are Boiler Nos. 6 and 7.

The Boiler MACT 5D will result in new emission limits for only four (4) pollutants, filterable PM, HCl, Hg, and CO. With installation of the proposed DSI systems on Boiler Nos. 6 and 7, there will be no change in the current CO emission rates. The new Boiler MACT 5D limit for coal combustion will be 130 ppmvd corrected to 3% O_2, 3 run average or 230 ppmvd corrected to 3% O_2, 30-day rolling average. Previous performance tests indicate actual CO concentrations of only 25-35 ppmvd corrected to 7% O_2 from these boilers when firing 100% coal.

There will be no potential increase in Hg emissions with installation of the DSI systems. However, it is conceivable that sorbent injection into the exhaust ductwork, which will provide more particles for condensation nuclei for Hg compounds, with subsequent capture by the baghouses, could potentially reduce HG emissions. The initial Hg performance tests after installation of the DSI systems will indicate whether there is any significant reduction in Hg emissions. The new Boiler MACT 5D Hg limit for coal combustion will be 5.7E-06 lb/MMBtu. Previous performance tests indicate current Hg emission rates of only 2.75E-07-4.30E-07 lb/MMBtu from these boilers when firing 100% coal.

The DSI systems to be installed on Boiler Nos. 6 and 7 are for the primary purpose of reducing HCl emissions to ensure compliance with the Boiler MACT 5D 0.022 lb/MMBtu. The previous performance tests indicate current HCl emission rates that range from 0.013-0.122 lb/MMBtu. The variation in HCl emissions is primarily due to the variation in the chlorine content of the coals burned during the tests. Calculations show a maximum potential uncontrolled HCl emission rate of 0.165 lb/MMBtu based on combustion of a 12,500 Btu/lb coal with a 2,000 ppmwt. chlorine content. The minimum combined HCl control efficiency to meet the 0.022 lb/MMBtu limit for this worse-case coal required by the existing limestone injection systems (into the furnace) and the add-on DSI systems is 86.6%. The initial Boiler MACT 5D performance tests will be used to establish the necessary limestone injection and duct sorbent injection rate operating limit(s) to ensure compliance with the new HCl limit.

The only pollutant with a potential emissions increase resulting from the installation of the proposed DSI system is filterable PM. This potential increase is due to increased reacted and unreacted sorbent dust loadings to the baghouses, and insignificant PM emissions from the new DSI sorbent storage silos and weigh/feed hoppers. The calculated potential controlled PM emissions from the silos are based on a maximum potential 400 lb/hr (1,752 ton/yr) sorbent use rate per boiler and an AP-42 (§11.12) emission factor of 0.00099 lb/ton for controlled PM. The AP-42 emission factor is for pneumatically loaded (air conveyed) elevated cement storage silos equipped with bin vent filters at concrete batch plants. Based on the maximum annual sorbent loading rate and the AP-42 emission factor, potential filterable PM emission increases associated with each new sorbent storage silo would be only 1.73 lb/yr. Potential filterable PM emissions from the weigh/feed hoppers would be even lower since these unit will not be pneumatically loaded. At the maximum 400 lb/hr potential sorbent injection rate and worse-case uncontrolled HCl emissions associated with a 12,500 Btu/lb coal with a 2,000 ppmwt. chlorine content at the maximum firing rate of each boiler (323.17 MMBtu/hr), the calculated increased reacted and unreacted filterable PM loadings to each baghouse is a maximum of 423.3 lb/hr. At an assumed 99.8% control efficiency for each baghouse, controlled filterable PM emissions could potentially increase by 0.847 lb/hr. At the maximum 323.17 MMBtu/hr firing rate of each boiler, the 0.847 lb/hr increase is equivalent to 0.0026 lb/MMBtu. Previous performance test indicate current PM emission rates of only 0.0025-0.0040 lb/MMBtu from these boilers when firing 100% coal. If the filterable PM after installation of the DSI increased by the potential 0.0026 lb/MMBtu calculated, the new total filterable PM would be a maximum of only 0.0066 lb/MMBtu versus the Boiler MACT 5D limit of 0.04 lb/MMBtu. While the calculated potential increase is low, it is also believed that any actual increase would be insignificant due to the nature of the baghouse air filtering process. It is well documented that the dust cake on baghouse bags actually performs the air filtration process and not the bags themselves. Typically, a given baghouse on a particular source

(consistent filter cake composition) will have a consistent penetration rate (gr/dscf) that does not vary with the dust loading to the baghouse. Because of this factor, controlled emissions from the baghouses would not be expected to have any significant increase in controlled emissions associated with installation of the DSI. However, the increased dust loadings to the baghouses may require more frequent bag cleaning.

X. Facility Emissions Review

See Table in the header for a summary of the actual emissions as reported to DAQ from the years 2012 to 2016.

Orange County has triggered increment tracking under PSD for PM-10, NOx, and SO_2. This modification will result in an increase in PM_{10} emissions of 0.07 pounds per hour, NOx emissions of 1.30 pounds per hour, and SO_2 emissions of 0.003 pounds per hour.

XI. Stipulation Review

The facility was last inspected by Stanley Williams on **August 30, 2017**. Based on his observations the facility appeared to be in compliance with their Title V permit requirements.

XII. Affected State(s) Review

A notice of the DRAFT Title V Permit shall be made pursuant to 15A NCAC 02Q .0521. The notice will provide for a 30-day comment period, with an opportunity for a public hearing. Consistent with 15A NCAC 02Q .0525, the EPA will have a concurrent 45-day review period. Copies of the public notice shall be sent to persons on the Title V mailing list and EPA. Pursuant to 15A NCAC 02Q .0522, a copy of each permit application, each proposed permit and each final permit pursuant shall be provided to EPA. Also, pursuant to 02Q .0522, a notice of the DRAFT Title V Permit shall be provided to each affected State at or before the time notice is provided to the public under 02Q .0521.

XIV. Conclusions, Comments, and Recommendations

A professional engineer's seal was submitted with the applications for this renewal/modification.

A zoning consistency determination was submitted with the applications required for this renewal/modification.

RRO recommends issuance of the permit and was sent a DRAFT permit prior to issuance (See Section III of this document for a discussion).

RCO concurs with RRO's recommendation to issue the renewal/modified air permit.